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(54) Title: COMPOSITIONS OF ORTHOGONAL LYSYL-TRNA AND AMINOACYL-TRNA SYNTHETASE PAIRS AND
USES THEREOF

(57) Abstract: Compositions and methods of producing components of protein biosynthetic machinery that include orthogonal
lysyl-tRNAs, orthogonal lysyl-aminoacyl-tRNA synthetases, and orthogonal pairs of lysyl-tRNAs/synthetases, which incorporate
homoglutamines into proteins are provided in response to a four base codon. Methods for identifying these orthogonal pairs are also
provided along with methods of producing proteins with homoglutamines using these orthogonal pairs.

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